U.S. DEPARTMENT OF ENERGY

Office of ENERGY EFFICIENCY & RENEWABLE ENERGY

Improving UPS Efficiency Using "Eco-Mode"

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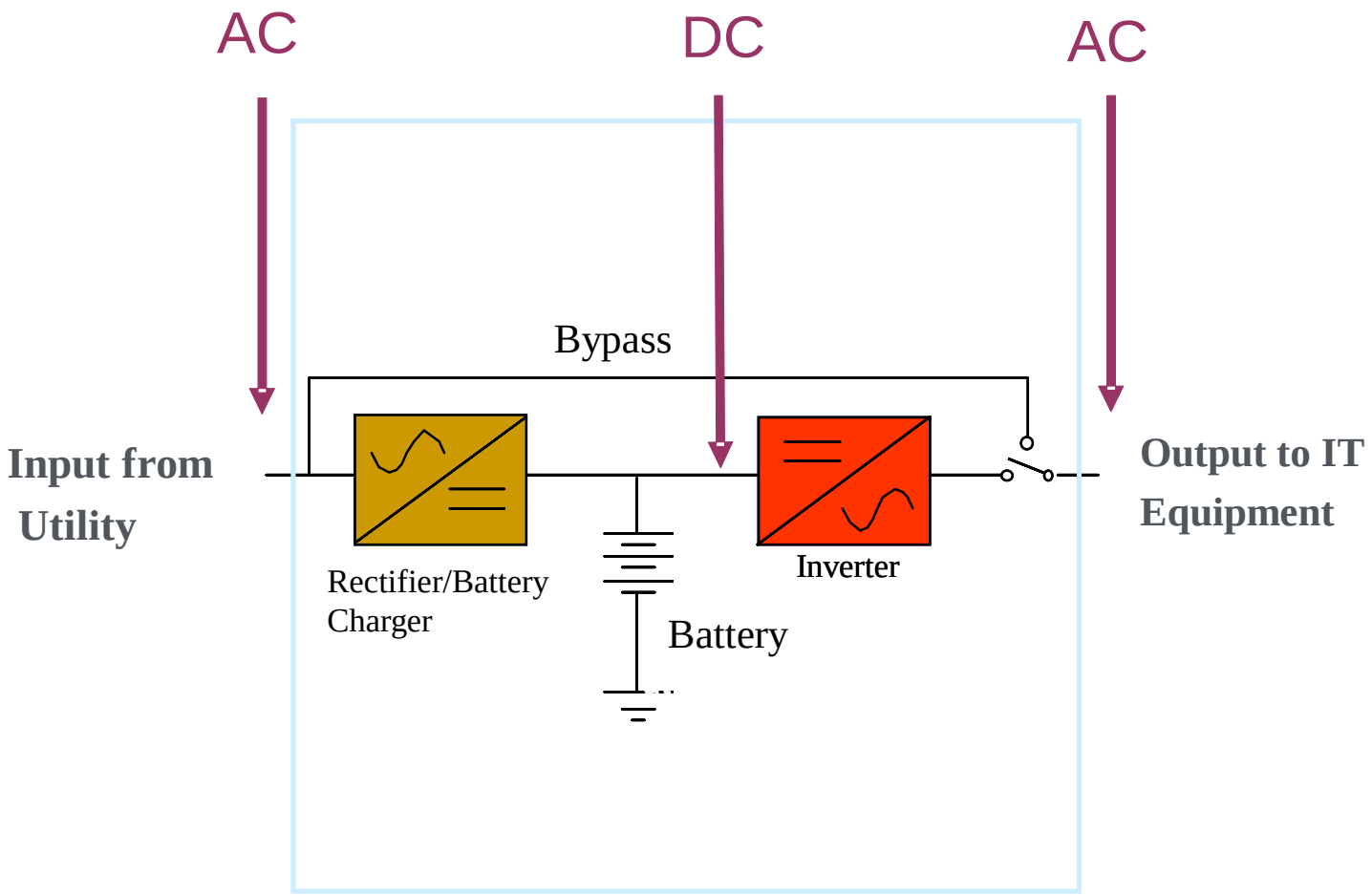
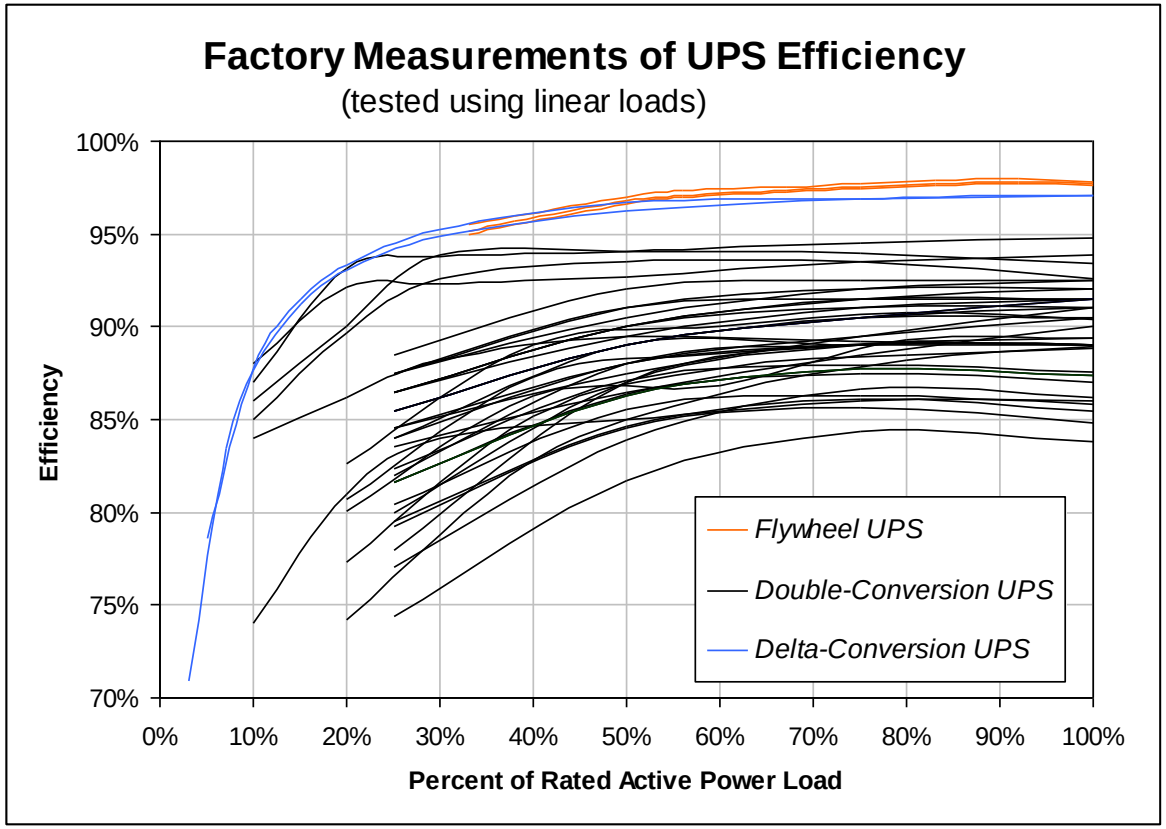
FEMP Federal Energy Management Program

Typical Uninterruptible Power Supply (UPS)



UPS Efficiency Drops as the Load Drops



What is “Eco-Mode”?

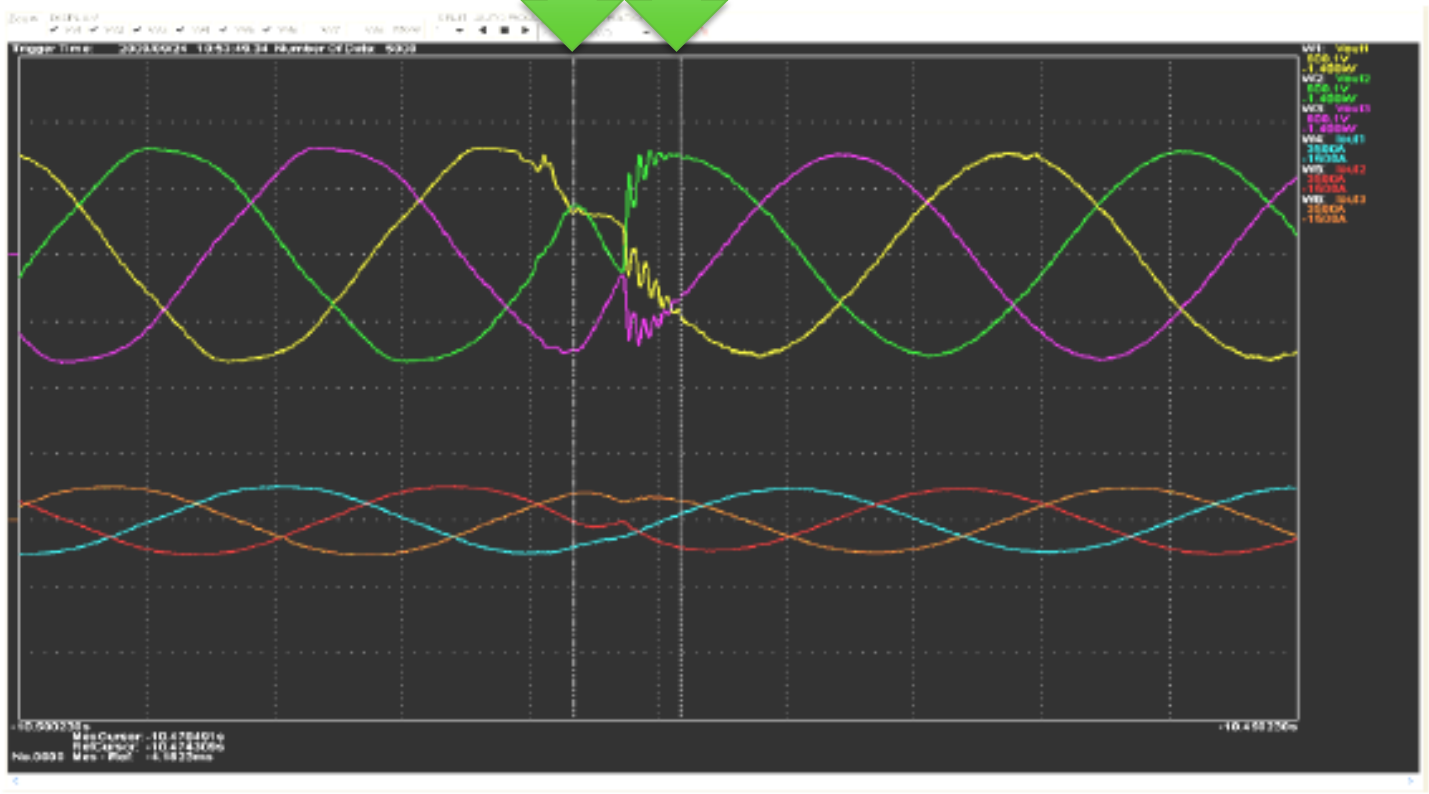
- **Use of UPS bypass except when inverter is actually needed**

- **Various names:**
  - EConversion™ “advanced Eco Mode”
  - ESS (Energy Saving System)
  - SEM (Super EcoMode)
  - VFD (Voltage and Frequency Dependent)
  - Maximum Energy Saving Mode

- **Switches from bypass to inverter mode in far less than a cycle**

Example of UPS in Eco Mode response to power failure

Outage Start Inverter Operation



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How much does Eco-Mode save?

- **Official number, estimated**
  - 2-3% (based on design numbers)
- **LBNL NERSC (ESS, ~30% loading) : ~15% measured**
- **Other sites (based on actual loading and factory efficiency info):**
  - A: 3% (11% with module shutdown, new UPS units, eco-mode)
  - B: 2% (5% with module shutdown and eco-mode)
  - C: 2% (8% with module shutdown, new UPS, eco-mode)
- **Your mileage will vary!**

LBNL NERSC Eco-Mode Experience

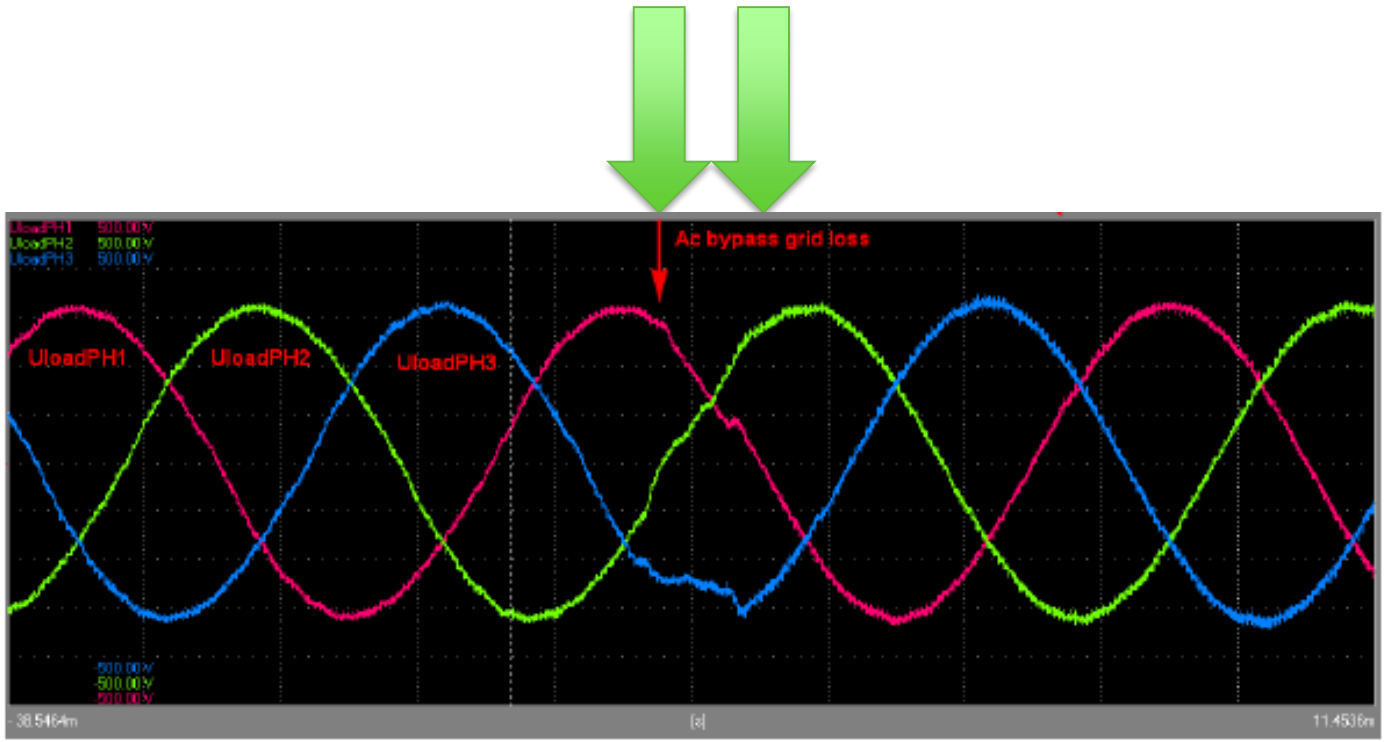
- ESS (“Energy Saving System”)
- Required firmware upgrade, not cheap but very cost-effective
- 1100 kVA rating, one side of double-fed IT equipment
- Typical loading 25-50%
- Savings of 10-18%
- No problems (though no known outages)

What is “Advanced Eco-Mode”?

- **Use of UPS bypass except when inverter is actually needed; inverter remains on**
  - Less disruption to the waveform when there is a disturbance
  - Can act as harmonic filter
  - Slightly less savings than full Eco-Mode

Example of UPS in Advanced Eco Mode response to power failure

Outage Start Inverter Operation



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Questions

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